Unit C: Pre-Trip Responsibilities

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I. Introduction
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8VAC20-70-380. Pre-trip safety inspection. The drivers of school and activity buses shall perform a daily pre-trip safety inspection of the vehicle prior to transporting children. The items checked and recorded shall be at least equal to the pre-trip inspection procedure as prescribed by the Department of Education.

Driving a school bus entails many responsibilities, one of which is performing basic inspections to detect defects or deficiencies on the school bus. Performing a pre-trip inspection before a run and a post trip inspection after a run can help detect defects or deficiencies. This is the first step in the maintenance process of pupil transportation.

School bus maintenance plays a vital role in pupil transportation. The school bus maintenance staff is responsible for performing scheduled services and inspections. These services help to keep the buses safe and the transportation system efficient. By reporting any defects or deficiencies found during the pre-trip or post trip inspections, the driver can help to ensure the school buses remain a safe mode of transportation.

Basic knowledge of the school bus components is instrumental in performing an accurate daily pre-trip inspection. Familiarizing his/herself with the bus and knowing its condition will be useful in adjusting driving performance while on the route.

Discussion: Discuss your division's policies and procedures concerning pre-trips.

II. Bus Components and Systems

The bus components or systems have been divided into seven areas:

1. Braking System
Slide 3

a. Hydraulic Brakes
Hydraulic brakes work through fluid pressure. When the brake pedal is depressed, the pressure on the brake pedal moves the piston within the master cylinder, forcing the brake fluid from the master cylinder through the tubing and flexible hose to the wheel cylinders. The wheel cylinders contain two opposed output pistons each of which is attached to a brake shoe fitted inside the brake drum. The output pistons push the brake shoes against the wall of the brake drum, thus retarding the rotation of the wheels.

b. Air Brakes
Air brakes use compressed air to make the brakes work. The air brake system is composed of three combined braking systems: Service brake, Parking brake and Emergency brake. The service brake system applies and releases the brakes when the brake pedal is depressed during normal driving. The parking brake system applies and releases the park brake when the park brake control is used. The emergency brake system uses parts of the service and parking brake systems to stop the vehicle in the event of a brake system failure.

c. Anti-lock Braking System
The anti-lock braking system uses a computer to monitor and control the braking system. The computer monitors the rotational speed of the wheels through sensors and then releases the brakes when the wheels are about to lock up.

2. Engine
Slide 4

a. Diesel Engines
The injector pump feeds fuel from the fuel tank to injectors which spray a metered mist of fuel into the engine's combustion chamber. The upward movement (compression stroke) of the pistons creates sufficient heat to ignite the fuel. The ignited fuel causes the pistons to move. The motion of the pistons turns the crankshaft, which is connected to the other components of the power train. The diesel engine requires no

carburetion system or electrical firing system. Diesel engines are often equipped with manifold pre-heaters which aid combustion when starting the engine. Fumes are released from the diesel engine through the exhaust system.

b. Gasoline Engines
A fuel pump draws fuel from the fuel tank and feeds it to the carburetor or injectors, which mixes it with air. The fuel/air mixture is fed into the engine's combustion chamber where it is ignited by the spark plugs. The ignited mixture (explosion) causes the pistons to move, which in turn causes the crankshaft to turn. The rotating crankshaft transfers power from the engine to the transmission. The power is then carried to the drive shaft, the differential (rear end), the rear axles, and the rear wheels. The remaining gas from the ignited mixture exits the engine through the exhaust system. Included in the exhaust system is the muffler (dampens the noise) and the tailpipe. The tailpipe extends sufficiently beyond the bus so the noxious fumes cannot enter the passenger compartment.

3. Transmissions
Slide 5
A transmission is a speed and power changing device installed at some point between the engine and driving wheels of a vehicle. It provides a means for changing the ratio between engine RPM (revolutions per minute) and driving wheel RPM to best meet each particular driving situation. There are two types of transmissions- manual and automatic. If the bus has a manual transmission, the driver will have to shift the gears, usually with a stick located on the console and the clutch pedal. If the bus has an automatic transmission, the mechanism changes without any help from the driver.

a. Manual Transmissions
The manual transmission provides a means of varying the relationship between the speed of the engine and the speed of the wheels. Varying these gear ratios allows the right amount of engine power at many different speeds. Manual transmissions require the use of a clutch to apply and remove engine torque to the transmission input shaft. The clutch allows this to happen gradually so the vehicle can be started from a complete stop.

b. Automatic Transmissions
Automatic transmissions automatically change to higher and lower gears with changes in the vehicle's speed and the load on the engine. This system is operated by transmission fluid pressure; shift valves control the gear changes. A governor controls the shifting of the gears.

It's linked to the output shaft and throttle valve and controls the transmission fluid supply at different pressures to the shift valve.

4. Steering
Slide 6
The steering system incorporates the steering wheel, steering column, a gearbox and pitman arm or a rack and pinion assembly, steering knuckles and ball joints, and the wheel spindle assemblies. Power steering systems add a hydraulic pump, fluid reservoir, hoses and lines. The rotating movement of the steering column by the steering wheel activates mechanisms inside the steering box; this passes on the steering wheels movement to the tie rods. The steering arm picks up the motion from the tie rods and cause the steering knuckles to turn the wheels.

5. Suspension System
Slide 7
The suspension system has two basic functions- to keep the vehicle's wheels in firm contact with the road and to provide a comfortable ride for the passengers. A lot of the system's work is done by the springs. Under normal conditions, the springs support the body of the vehicle evenly by compressing and rebounding with every up and down movement. The up and down movement effects are reduced by the shock absorbers.

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6. Electrical System

Slide 8

The first major component in the electrical system is the battery. The battery is the initial source of electricity and is used to store power for starting and for running auxiliary devices. The next major component is the starter motor. The starter converts electricity to mechanical energy which is used to start the engine. The third component is the alternator. It is the charging device powered by the engine. The alternator powers the electrical system when the vehicle is running and restores the charge within the battery. With these basic components, the vehicle maintains its supply of electricity. A device called the voltage regulator keeps the power level stabilized and the fuse box keeps minor problems from becoming major ones.

7. Traffic Warning System

Slide 9

School bus warning systems are governed by state law that specifically outline the required warning system.

a. Buses shall be equipped with four red lamps and four amber lamps.
b. The traffic warning light system shall be wired so that the amber lamps are activated manually by a hand operated switch. When the door is opened, amber lamps will be automatically deactivated and red lamps, warning sign with flashing lamps and crossing control arm shall be activated. When the door is closed, all lamps shall be deactivated.

Newer school buses are equipped with a non-sequential system. This system operates the warning devices on the school bus. The red warning lights, warning sign with flashing lights, and crossing control arm are automatically activated, as a preventative feature, whenever the door is opened. (**Code of Virginia 46.2-1090**)

III. What is Preventive Maintenance?

Slide 10

In order to maintain a safe fleet and keep the bus in serviceable condition, a cost effective maintenance program is incorporated into the school districts. Whether it is on-site or contracted maintenance, it plays a vital role in keeping the school buses properly maintained.

Virginia Administrative Code (8 VAC 20-70-130) requires that buses be inspected and maintained on a regular basis and Virginia Administrative Code (8 VAC 20-70-380) also requires drivers of school buses to perform daily pre-trip safety inspections.

Preventive maintenance involves making minor adjustments which could prevent vehicle failures that could result in an accident, injury or death of an individual. The objectives of a preventive maintenance program are:

- Keep the bus in a safe operating condition
- Prevent failures and breakdowns
- Maintain the bus in a serviceable operating condition
- Lower maintenance costs
- Preserve bus components
- Eliminate problems for the driver

1. Pre-Trip Safety Inspection

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The pre-trip safety inspection is the first step in preventive maintenance. Inspecting the bus and recording the results before starting a route or field trip is mandatory.

A written report of the defects or deficiencies detected must be submitted to the maintenance department. The bus will not be operated if a defect prevents its safe and/or legal operation. The following is the step by step procedure for performing the pre-trip safety inspection:

See the Pre-trip Inspection procedure on page 5. A sample Pre-trip Inspection form is located in Unit J.

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IV. Operation of the Bus

Slide 12

The school bus is unique in many ways and the school bus driver is in charge with unique responsibilities. While driving the school bus the driver will become familiar with the way it handles and will eventually be able to tell when that bus is not running properly. Learning to recognize defects or malfunctions and immediately reporting them will help the maintenance department keep the bus running safe and efficiently.

Remember: Defects cannot be repaired if they are not reported.

Be Perceptive, the vehicle "talks" in many ways.

1. Listen for problems:
a. Engine knocking sounds
b. Clicking or tapping noises
c. Continuous or intermittent squeals or squeaks
d. Loud exhaust noise
e. Engine backfiring, missing, popping
f. Spitting, steaming, or hissing
h. Air leaks

2. Feel for problems:
a. Excessive vibrations
b. Low speed or high speed shimmy
c. Hard steering or steering wander

3. Look for problems:
a. Check gauges
b. Excessive smoke coming from the exhaust
c. Smoke coming from under the hood
d. Smoke coming from under the dash

4. Smell for trouble:
a. Odor of gasoline/fuel
b. Odor of burning rubber
c. Odor of burning oil
d. Odor of burning rags
e. Odor of exhaust fumes

Discussion: Discuss the proper procedure in reporting defects on a school bus.

Discussion: Discuss in detail the pre-trip procedure.

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Pre-Trip Inspection

A. Under Hood Inspection

1. Check under bus for leaks (wet spots)
• Look for darker, shiny, oil spots
• Green or pinkish fluid indicates antifreeze; red fluid would be power steering fluid; black fluid would be oil.

2. Check engine compartment (under hood)

a. Oil level: Pull dipstick and check level when engine is cold. Bus should be on level surface and oil level should be in the safe marking area.
b. Coolant level: Look for the coolant level through the radiator reservoir indicator or the indicator on the radiator. If the bus does not have a radiator reservoir or indicator, the radiator cap should be removed and the coolant level checked.
c. Power steering fluid: Remove the cap and check level of fluid when engine is cold. It should register on the full mark.
d. Water pump: Check for missing bolts or visible coolant leaks. Check for loose fan blades.
e. Check alternator: Check for missing bolts. Inspect housing for cracks. Check belt tension by trying to turn the pulley by hand. If you can turn the pulley by hand, the belts are too loose.
f. Check air compressor: Check air compressor for missing bolts and oil leaks. Check compressor belts for tightness and listen for air leaks.
g. Check master cylinder: (Hydraulic brakes) Check fluid level by looking at the fill lines on the master cylinder housing.
h. Check for air leaks: Listen for air leaking from lines.
i. Check belts: Look for frayed, cracked or worn spots on the belts. Check belts for tightness.
j. Check washer fluid reservoir.

B. Inside Bus

1. Start the engine
a. Oil pressure: Check oil pressure gauge for building pressure. Stop engine if there is no pressure reading.
b. Alternator: Check voltmeter for proper voltage – 12 to 14 volts.
c. Air pressure: Check air pressure gauge for building pressure.
d. Steering: Check steering by turning the steering wheel in both directions for free play of no more than two inches.
e. Parking brake: Set parking brake and put transmission in gear and try to pull forward. Bus should not move forward.
f. Mirrors and windshield: Look for cracks and fog areas in both windshield and mirrors. Check for proper mirror adjustment.
g. Wipers: Check blades and operate left and right wipers.
h. Dash indicator lights: Check turn signals, high beam indicator and dash and warning lights.
i. Horn: Depress horn button, check if hi and low horns are operating.
j. Heater/defroster: Turn on and check if blowing air in the high and low positions. Listen for unusual noises or smells coming from the heater motors.
k. Air brake check:

1. Build up air pressure to 120.
2. Turn engine off - check to see that pressure does not drop more than 2 lbs. in one minute.
3. Release all brakes.
4. Turn key on and apply the brake and hold steady pressure. Check to see that the pressure does not drop more than 3 lbs. in one minute.
5. Begin pumping brakes to decrease air pressure. At approx. 60 lbs. of air pressure, the warning light should come on and the buzzer should sound. Continue pumping the brakes until the pressure drops below 40 lbs.
The emergency brakes should pop on.

C. Turn on all Lights and Exit Bus

Turn on headlights, four-way hazards, clearance lights and traffic warning lights.

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Check head light dimmer switch. Exit bus with engine running, transmission in neutral and parking brake set.

D. Start at Right Front Tire

1. Hub oil seal: Look for grease or oil leaking from seal. The area will appear to be wet or shiny. Look for missing bolts.
2. Lug nuts: Look for missing lugs. Look for rust around lugs. Check for loose lugs by turning lugs with your hand.
3. Rim: Look for cracks, indentations or welds.
4. Tire: Look for cuts, wear bars, knots or any other imperfections in the tire. Tread depth must be a minimum of 4/32 or 1/8" on any tread on the tire.
5. Spring and spring mount: Look for broken spring leaves — will look like a line of rust. Look at u-bolts and spring hangers for cracks or looseness or missing cotter keys.
6. Shock absorbers: Grab shock with hand and shake for looseness. Look for oil running out of the shock or wet area on bottom of shock.
7. Slack adjuster: (air brake only) Check that both pins have cotter keys. The slack adjuster should be set at 90 degrees. All four wheels should be at the same angle.
8. Brake chamber: (air brake only) Look for loose or missing bolts. Look for rust around the chamber.
9. Brake hoses: Look for wet or shiny areas on hose or around fittings. Look for frayed, cracked, or rubbing hoses.
10. Drum or rotor: Look for cracks or missing pieces.

E. Go to Front of Bus

1. Mirror at entrance door: Make sure it is tight. Look for broken brackets or missing bolts.
2. Lights: Look at headlights, four-way hazards, clearance, red traffic warning lights.
3. Crossing gate: Should be in the extended position.
4. Crossover mirrors: Check for looseness and broken brackets.
5. Stop sign: Sign should be out and lights flashing.

F. Left Front Tire

1. Hub oil seal: Look for grease or oil leaking from seal. The area will appear to be wet or shiny. Look for missing bolts.
2. Lug nuts: Look for missing lugs. Look for rust around lugs. Check for loose lugs by turning lugs with your hand.
3. Rim: Look for cracks, indentations or welds.
4. Tire: Look for cuts, wear bars, knots or any other imperfections in the tire. Tread depth must be a minimum of 4/32 or 1/8" on any tread on the tire.
5. Spring and spring mount: Look for broken spring leaves — will look like a line of rust. Look at u-bolts and spring hangers for cracks or looseness or missing cotter keys.
6. Shock absorbers: Grab shock with hand and shake for looseness. Look for oil running out of the shock or wet area on bottom of shock.
7. Slack adjuster: (air brake only) Check that both pins have cotter keys. The slack adjuster should be set at 90 degrees. All four wheels should be at the same angle.
8. Brake chamber: (air brake only) Look for loose or missing bolts. Look for rust around the chamber.
9. Brake hoses: Look for wet or shiny areas on hose or around fittings. Look for frayed, cracked, or rubbing hoses.
10. Drum or rotor: Look for cracks or missing pieces.
11. Steering box: Check for fluid leaks. Check mounting bolts.
12. Steering linkage: Look for missing nuts, bolts, cotter keys, or other parts. Check for bent, loose or broken parts.
13. Check left side mirror: Make sure it is tight. Look for broken brackets or missing bolts.

G. Check under Bus (Left side)

1. Drive shaft: Check that all u-shaped safety brackets are in place. Check that the u-bolts on drive line are not missing.

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2. Exhaust system: Listen for leaks; smell for fumes. Look for black soot around connections.
3. Frame: Look for cracks.
4. Check for loose wiring or items hanging down.

H. Left Rear Wheels

1. Hub oil seal: Look for grease or oil leaking from seal. The area will appear to be wet or shiny. Look for missing bolts.
2. Lug nuts: Look for missing lugs. Look for rust around lugs. Check for loose lugs by turning lugs with your hand.
3. Rim: Look for cracks, indentations or welds.
4. Tire: Look for cuts, wear bars, knots or any other imperfections in the tire. Tread depth must be a minimum of 2/32 or 1/16" on any tread on the tire.
5. Spring and spring mount: Look for broken spring leaves — will look like a line of rust. Look at u-bolts and spring hangers for cracks or looseness or missing cotter keys.
6. Shock absorbers: Grab shock with hand and shake for looseness. Look for oil running out of the shock or wet area on bottom of shock.
7. Slack adjuster: (air brake only) Check that both pins have cotter keys. The slack adjuster should be set at 90 degrees. All four wheels should be at the same angle.
8. Brake chamber: (air brake only) Look for loose or missing bolts. Look for rust around the chamber.
9. Brake hoses: Look for wet or shiny areas on hose or around fittings. Look for frayed, cracked, or rubbing hoses.
10. Drum or rotor: Look for cracks or missing pieces

I. Rear of Bus

1. Lights: Check taillights, four-way hazards, traffic warning lights and clearance lights.
2. Check reflectors: Red on rear and yellow on front.
3. Rear emergency door: Door should open freely and lock in the open position. Check that gaskets are in place around door.
4. Make sure exhaust extends out from underneath the bus.

J. Right Rear Wheels

1. Hub oil seal: Look for grease or oil leaking from seal. The area will appear to be wet or shiny. Look for missing bolts.
2. Lug nuts: Look for missing lugs. Look for rust around lugs. Check for loose lugs by turning lugs with your hand.
3. Rim: Look for cracks, indentations or welds.
4. Tire: Look for cuts, wear bars, knots or any other imperfections in the tire. Tread depth must be a minimum of 2/32 or 1/16" on any tread on the tire.
5. Spring and spring mount: Look for broken spring leaves — will look like a line of rust. Look at u-bolts and spring hangers for cracks or looseness or missing cotter keys.
6. Shock absorbers: Grab shock with hand and shake for looseness. Look for oil running out of the shock or wet area on bottom of shock.
7. Slack adjuster: (air brake only) Check that both pins have cotter keys. The slack adjuster should be set at 90 degrees. All four wheels should be at the same angle.
8. Brake chamber: (air brake only) Look for loose or missing bolts. Look for rust around the chamber.
9. Brake hoses: Look for wet or shiny areas on hose or around fittings. Look for frayed, cracked, or rubbing hoses.
10. Drum or rotor: Look for cracks or missing pieces.

K. Check Fuel Area

1. Tank: Check to see that fuel cap is on tank. Look for gasket on fuel cap. Look for cracks or loose parts or missing pieces of fuel tank cage.
2. Leaks: Look for fuel spills on the ground.

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L. Check inside Bus

1. Entrance door: Check for broken glass and that door closes properly.
2. Step treads: All treads must be securely fastened and not pose a tripping hazard. Keep area open and free of any articles.
3. Handrails: Check for looseness and catch points.
4. Seat cushion bottoms: When walking to the back of the bus, grab the back corner of the seat cushion bottom and pull up to see if properly attached. Do one row at a time. All seats must be checked. Check for cut or torn covers.
5. Emergency doors and windows: Open to check alarm buzzer.
6. Seat backs: When walking to the front of the bus, check the backs of each seat by grabbing the top corner of the seat and shake to see if it is loose or broken. Check for cut or torn covers.
7. Windows: Check for cracked or broken glass. Check for proper operation.
8. Folding seat: (at emergency side door) Check for proper fold up operation.
9. Roof hatch: Open and check for proper operation of emergency buzzer.
10. Emergency equipment: Check fire extinguisher to make sure it is properly secured and fully charged. Check triangle reflective markers. Check first aid kit and body fluid clean up kit.

M. Final Check

1. Brake and backup lights: Put in reverse and check back-up light. Depress brake pedal and look for red reflection of brake lights.
2. Turn signal lights: Check front and rear.
3. Clutch and transmission: Start bus and put in gear, release clutch and check for proper engagement.
4. Brake: Pull forward and depress brake to check for proper stopping ability.
5. Steering: Work steering wheel back and forth to check for proper control.

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Questions

1. The _____ of school and activity buses shall perform a daily _____ of the vehicle prior to transporting children.

2. The air brake warning buzzer should sound off when the air pressure is below _____ psi.

3. If a mechanical problem is found, it should be reported to the _____ department.

4. Describe the procedure for reporting bus defects in your area.

5. Describe possible equipment failure or defects that could be found on a school bus.

Answers

1. drivers, pre-trip inspection
2. 60
3. maintenance
4. Answers will vary
5. Answers will vary